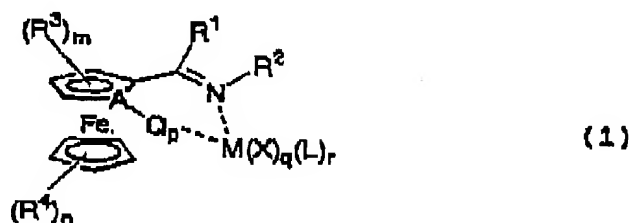


What Is Claimed Is:

1. A transition metal compound represented by the following formula (1):



wherein M represents a transition metal atom selected from the group consisting of metal atoms of group 3 to group 12 of the periodic table;

X represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbyloxy group having 1 to 20 carbon atoms, an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a sulfonate group having an organic residue with 1 to 20 carbon atoms, or a non-coordinative anion containing an element selected from the group consisting of B, Al, P and Sb, and, when q is an integer of at least 2, Xs may be the same as or different from each other;

A represents a carbon atom, a nitrogen atom or a phosphorus atom;

R¹ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one halogen atom, or a ferrocenyl group or a substituted ferrocenyl group;

R² represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of halogen, silicon, nitrogen, oxygen and sulfur atoms, or a ferrocenyl group or a substituted ferrocenyl group; and R¹ and R² may form together a ring;

Q represents a hydrogen atom, a hydrocarbon group having

COPY

1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen and sulfur atoms, or oxygen or sulfur; and, when Q contains a coordinative atom, Q can be coordinatively bound to M;

R^3 represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, oxygen, halogen and sulfur atoms and one of R^3 's adjacent to Q may form a ring together with Q; and, when m is an integer of at least 2, R^3 's may be the same as or different from each other, and adjacent R^3 's may form together a ring;

R^4 represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of at least 2, R^4 's may be the same as or different from each other, and adjacent R^4 's may form together a ring; and R^3 and R^4 may form together a ring; and, when R^4 contains a heteroatom, R^4 can coordinate with the transition metal atom M;

L is a coordinate bond-forming compound selected from the group consisting of π electron, ethers, nitriles, amines and

COPY

phosphines, and L may be bound to X;

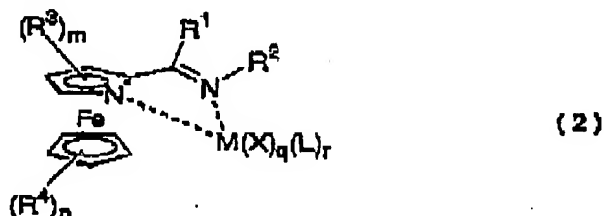
m is an integer of 1 to 3, n is an integer of 1 to 5, and p is an integer of 0 or 1;

when Q is sulfur or oxygen, the bond between Q and M is a sigma bond;

when p is 0 and A is a nitrogen atom or a phosphorus atom, A can be coordinatively bound to M; and

q is an integer of 1 to 3 and r is an integer of 0 to 3.

2. A transition metal compound represented by the following formula (2):



wherein M represents a transition metal atom selected from the group consisting of metal atoms of group 3 to group 12 of the periodic table;

X represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a sulfonate group having an organic residue with 1 to 20 carbon atoms, or a non-coordinative anion containing an element selected from the group consisting of B, Al, P and Sb, and, when q is an integer of at least 2, Xs may be the same as or different from each other;

R¹ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one halogen atom, or a ferrocenyl group or a substituted ferrocenyl group;

R² represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of halogen, silicon, nitrogen, oxygen and sulfur atoms, or a ferrocenyl group or a substituted ferrocenyl group;

COPY

and R^1 and R^2 may form together a ring;

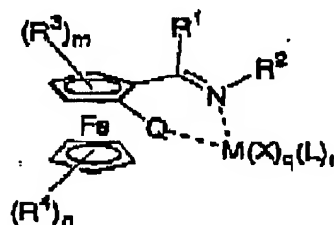
R^3 represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, oxygen, halogen and sulfur atoms and, when m is an integer of at least 2, R^3 's may be the same as or different from each other, and adjacent R^3 's may form together a ring;

R^4 represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of at least 2, R^4 's may be the same as or different from each other, and adjacent R^4 's may form together a ring; and R^3 and R^4 may form together a ring;

L is a coordinate bond-forming compound selected from the group consisting of π electron, ethers, nitriles, amines and phosphines, and L may be bound to X ;

m is an integer of 1 to 3, n is an integer of 1 to 3, q is an integer of 1 to 3 and r is an integer of 0 to 3.

3. A transition metal compound represented by the following formula (3):



(3)

COPY

wherein M represents a transition metal atom selected from the group consisting of metal atoms of group 3 to group 12 of the periodic table;

X represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbyloxy group having 1 to 20 carbon atoms, an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a sulfonate group having an organic residue with 1 to 20 carbon atoms, or a non-coordinative anion containing an element selected from the group consisting of B, Al, F and Sb, and, when q is an integer of at least 2, Xs may be the same as or different from each other;

R¹ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one halogen atom, or a ferrocenyl group or a substituted ferrocenyl group;

R² represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of halogen, silicon, nitrogen, oxygen and sulfur atoms, or a ferrocenyl group or a substituted ferrocenyl group; and R¹ and R² may form together a ring;

Q represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen and sulfur atoms, or oxygen or sulfur; and, when Q contains a coordinative atom, Q can be coordinatively bound to M;

R³ represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group

COPY

having one or more hydrocarbon groups each with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, oxygen, halogen and sulfur atoms, and one of R^3 s adjacent to Q may form a ring together with Q; and, when m is an integer of at least 2, R^3 s may be the same as or different from each other, and adjacent R^3 s may form together a ring;

R^4 represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of at least 2, R^4 s may be the same as or different from each other, and adjacent R^4 s may form together a ring; and R^3 and R^4 may form together a ring; and, when R^4 contains a heteroatom, R^4 can coordinate with the transition metal atom M;

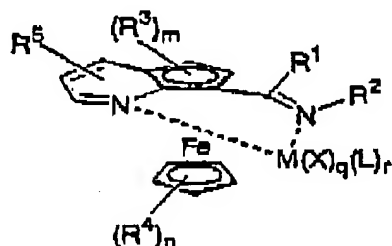
L is a coordinate bond-forming compound selected from the group consisting of π electron, ethers, nitriles, amines and phosphines, and L may be bound to X;

m is an integer of 1 to 3 and n is an integer of 1 to 5;

when Q is sulfur or oxygen, the bond between Q and M is a sigma bond; and

q is an integer of 1 to 3 and r is an integer of 0 to 3.

4. A transition metal compound represented by the following formula (4):



(4)

COPY

wherein M represents a transition metal atom selected from the group consisting of metals of group 3 to group 12 of the periodic table;

X represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a sulfonate group having an organic residue with 1 to 20 carbon atoms, or a non-coordinative anion containing an element selected from the group consisting of B, Al, P and Sb, and, when q is an integer of at least 2, Xs may be the same as or different from each other;

R¹ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a trifluoromethyl group, a ferrocenyl group or a substituted ferrocenyl group;

R² represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of silicon, nitrogen, oxygen and sulfur atoms, or a ferrocenyl group or a substituted ferrocenyl group; and R¹ and R² may form together a ring;

R³ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms or a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms; and, when m is an integer of at least 2, R³s may be the same as or different from each other;

R⁴ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of at least 2, R⁴s may be the same as or different from each other, and adjacent R⁴s may form together a ring;

R⁵ represents a hydrogen atom, a hydrocarbon group having

COPIY

1 to 20 carbon atoms or an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms;

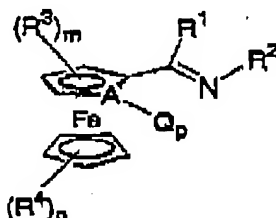
L is a coordinate bond-forming compound selected from the group consisting of π electron, ethers, nitriles, amines and phosphines, and L may be bound to X;

m is an integer of 1 or 2, n is an integer of 1 to 5, q is an integer of 1 to 3 and r is an integer of 0 to 3.

5. The transition metal compound according to any one of claims 1 to 4, wherein M represents a transition metal atom selected from the group consisting of metal atoms of group 8 to group 12 of the periodic table.

6. The transition metal compound according to any one of claims 1 to 4, wherein M represents a transition metal atom selected from the group consisting of Ni, Pd, Fe and Cu.

7. A coordinative compound represented by the following formula (5):



(5)

wherein A represents a carbon atom, a nitrogen atom or a phosphorus atom;

R^1 represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one halogen atom, or a ferrocenyl group or a substituted ferrocenyl group;

R^2 represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of halogen, silicon, nitrogen, oxygen and sulfur atoms, or a ferrocenyl group or a substituted ferrocenyl group; and R^1 and R^2 may form together a ring;

COPY

Q represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an amino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen and sulfur atoms, or a hydroxyl group or a thiol group;

R³ represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, oxygen, halogen and sulfur atoms and one of R³'s adjacent to Q may form a ring together with Q; and, when m is an integer of at least 2, R³'s may be the same as or different from each other, and adjacent R³'s may form together a ring;

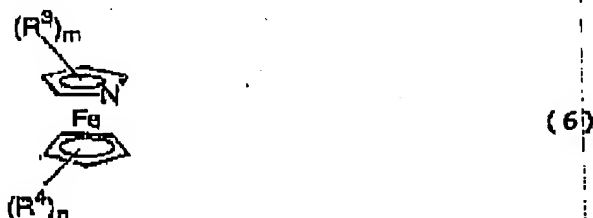
R⁴ represents a hydrogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of at least 2, R⁴'s may be the same as or different from each other, and adjacent R⁴'s may form together a ring; and R³ and R⁴ may form together a ring; and

m is an integer of 1 to 3, n is an integer of 1 to 5, and p is an integer of 0 or 1.

B. A compound which is a precursor to the coordinative

COPY

compound represented by formula (5) shown in claim 7, and which is represented by the following formula (6):



wherein R^3 represents a hydrogen atom, a halogen atom, a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, oxygen, halogen and sulfur atoms and, when m is an integer of at least 2, R^3 s may be the same as or different from each other, and adjacent R^3 s may form together a ring;

R^4 represents a hydrocarbon group having 1 to 20 carbon atoms, a silyl group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, a phosphino group having one or more hydrocarbon groups each with 1 to 20 carbon atoms, an oxy group having a hydrocarbon group with 1 to 20 carbon atoms, a thio group having a hydrocarbon group with 1 to 20 carbon atoms, or a hydrocarbon group having 1 to 20 carbon atoms and containing at least one atom selected from the group consisting of nitrogen, phosphorus, oxygen, halogen and sulfur atoms; and, when n is an integer of 1, R^4 is not a methyl group; and when n is an integer of at least 2, R^4 s may be the same as or different from each other, and all of the R^4 s are not simultaneously a methyl group; and adjacent R^4 s may form together a ring; and R^3 and R^4 may form together a ring; and

m is an integer of 1 to 3 and n is an integer of 1 to 5.

9. A catalyst for polymerization of an olefin, which comprises the transition metal compound as claimed in any one of claims 1 to 4.

COPY

10. A catalyst for polymerization of an olefin, which comprises the transition metal compound as claimed in any one of claims 1 to 4, and an activating cocatalyst.

11. A process for polymerization of an olefin, which comprises polymerizing an olefin in the presence of a catalyst comprising the transition metal compound as claimed in any one of claims 1 to 4.

12. A process for polymerization of an olefin, which comprises polymerizing an olefin in the presence of a catalyst comprising the transition metal compound as claimed in any one of claims 1 to 4, and an activating cocatalyst.

COPY

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.